

Claims

We claim:

- 5 1. A real-time path-directed controller for navigating an object along a desired path, said controller comprising:
 - (a) a position sensor, said position sensor producing an object position signal to an object position signal conditioning module, said object position signal conditioning module
10 producing a conditioned object position signal to a controller summer;
 - (b) a heading conditioning module, said heading conditioning module receiving the object position signal and conditioning the object position signal to produce a conditioned heading signal to the controller summer;
 - (c) a control apparatus sensor, said control apparatus sensor producing a control
15 apparatus signal to a control apparatus signal conditioning module, said control apparatus signal conditioning module producing a conditioned control apparatus signal to the controller summer;
and
 - (d) a controller-summer summing the conditioned object position signal, the conditioned heading signal, and the conditioned control apparatus signal to produce a controller
20 summer signal to a controller summer conditioning module so as to produce a control apparatus control signal to a control apparatus controller so as to direct the control apparatus and thereby direct the object by feedback control along the desired path.

2. The real-time path-directed controller of claim 1 wherein poles associated with the controller are selected in accordance with a linear multiplicative-integrative object dynamic model.

5 3. A real-time path-directed controller for navigating an object along a desired path, said controller comprising:

- (a) a position sensor, said position sensor producing an object position signal to an object position signal conditioning module, said object position signal conditioning module
10 producing a conditioned object position signal to a controller summer;
- (b) a heading conditioning module, said heading conditioning module receiving the object position signal and conditioning the object position signal to produce a conditioned heading signal to the controller summer;
- (c) a control apparatus sensor, said control apparatus sensor producing a control
15 apparatus signal to a control apparatus signal conditioning module, said control apparatus signal conditioning module producing a conditioned control apparatus signal to the controller summer;
- (d) a control apparatus null position conditioning module, said control apparatus null position conditioning module conditioning a distance-differentiated object position signal and conditioned control apparatus signal to produce a conditioned null position signal to the controller
20 summer; and
- (e) a controller summer summing the conditioned object position signal, the conditioned heading signal, the conditioned control apparatus signal, and the conditioned null position signal to produce a controller summer signal to a controller summer conditioning module

so as to produce a control apparatus control signal to a control apparatus controller so as to direct the control apparatus and thereby direct the object by feedback control along the desired path.

4. The real-time path-directed controller of claim 3 wherein poles associated with the
5 controller are selected in accordance with a linear multiplicative-integrative object dynamic model.

5. The real-time path-directed controller of claim 1 wherein the controller is configured to
operate in a multi-mode manner of operation.

10

6. The real-time path-directed controller of claim 3 wherein the controller is configured to
operate in a multi-mode manner of operation.

7. A controller as shown and described in this specification.

15